DOCUMENT RESUME

ED 389 385 PS 023 195

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TITLE Learning Goals and Self-Evaluation: Effects on Children's Cognitive Skill Acquisition.
PUB DATE Apr 95
NOTE 14p.; Paper presented at the Annual Meeting and Exhibit of the American Educational Research Association (San Francisco, CA, April 18-22, 1995.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Grade 4; Intermediate Grades; *Learning Processes; Mathematics Skills; *Performance Factors; Self Efficacy; Self Evaluation (Individuals); *Student Educational Objectives; Student Motivation

ABSTRACT

This study explored the conditions under which learning goals might be more effective than performance goals in raising achievement outcomes. Following a pretest, 40 fourth-grade students received instruction and practice on fractions operations. Half of the students were provided with the goal of learning how to solve problems (learning goal); the half were given a goal of solving problems (performance goal). All students in each goal condition evaluated their progress in skill acquisition. Results of the posttest indicated that, compared to the performance goal, the learning goal led to higher self-regulated performance, self-efficacy, skill, task orientation, self-evaluations, and self-satisfaction, as well as lower ego orientation. Self-evaluation and self-satisfaction scores correlated positively with self-efficacy, skill, and task orientation. Contains 21 references. (HTH)

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Learning Goals and Self-Evaluation: Effects on Children's Cognitive Skill Acquisition

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Abstract

This experiment investigated the effects of goals and self-evaluation on self-regulation processes and achievement outcomes. Fourth grade students received instruction and practice on fractions operations. Half of the students were provided with the goal of learning how to solve problems (learning goal); the other half were given a goal of solving problems (performance goal). All students in each goal condition evaluated their progress in skill acquisition. Providing a learning goal led to higher self-regulated performance, self-efficacy, skill, task orientation, self-evaluations, and self-satisfaction, as well as lower ego orientation, compared with providing a performance goal. Self-evaluation and self-satisfaction scores correlated positively with self-efficacy, skill, and task orientation. Implications of the results for educational practice are discussed.

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PS 023195

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Learning Goals and Self-Evaluation: Effects on Children's Cognitive Skill Acquisition

A topic assuming increasing educational importance is learners' self-regulation of their cognitions, motivation, and behaviors, to promote academic achievement (Zimmerman, 1989, 1994). Self-regulation involves self-observation, self-judgment, and self-reaction. Self-observation refers to deliberate attention to aspects of one's behavior to include their determinants and effects. Self-judgment entails comparing one's present performance level with one's goal to determine progress. Self-reaction refers to people's assessments of their performances (e.g., acceptable, unsatisfactory) (Bandura, 1986, 1991; Schunk, 1990).

This conceptualization postulates a central mediating role for self-efficacy, or personal beliefs about one's capabilities to learn or perform skills at designated levels. Learners acquire information to appraise self-efficacy from their performances, vicarious (observational) experiences, forms of persuasion, and physiological reactions (e.g., sweating, heart rate). Students who feel efficacious about learning choose to engage in tasks, select effective strategies, expend effort, and persist when difficulties are encountered (Bandura, 1986; Schunk, 1991; Zimmerman, 1989). In turn, these self-regulatory activities affect self-efficacy. As students work on tasks they observe their performances, compare them with their goals, and judge their progress. Positive assessments enhance self-efficacy and motivation (Bandura, 1991, 1993).

Two key elements of self-regulation are goal setting and self-evaluation. Goals provide standards against which people compare their present performances (Bandura, 1986; Locke & Latham, 1990). When students adopt a goal they may experience a sense of efficacy for attaining it, which motivates them to engage in appropriate activities, attend to instruction, persist, and expend effort. Students' initial self-efficacy is substantiated as they observe their goal progress because perceptions of progress convey they are becoming skillful. Self-efficacy sustains motivation and leads learners to establish new goals when they master their present ones (Bandura, 1988; Schunk, 1991).

The effects of goals depend on the properties of specificity, proximity, and difficulty (Bandura, 1988; Locke & Latham, 1990). Goals that incorporate specific performance standards, are close at hand, and are moderately difficult, are more likely to enhance performance than goals that are general, extend into the distant future, or are perceived as overly easy or difficult (Schunk, 1990, 1991). Goal effects also may depend on whether the goal denotes a learning or performance outcome (Meece, 1991). A learning goal refers to what knowledge and skills students are to acquire; a performance goal denotes what task students are to complete (Dweck & Leggett, 1988). Goal setting research typically has focused on such goals as rate or quantity of performance, but educators increasingly are advocating greater emphasis on learning processes and strategies (Weinstein, Goetz, & Alexander, 1988).

The self-evaluation process comprises both self-judgments of present performance by comparing it to one's goal and self-reactions to those judgments by deeming performance noteworthy, unacceptable, and so forth. Positive self-evaluations lead students to feel efficacious about learning and motivated to continue to work diligently because they believe they are capable

of making further progress (Schunk, 1991). Low self-judgments of progress and negative self-reactions will not necessarily diminish self-efficacy and motivation if students believe they are capable of succeeding but that their present approach is ineffective (Bandura, 1986). Such students may alter their self-regulatory processes by working harder, persisting longer, adopting what they believe is a better strategy, or seeking help from teachers and peers (Schunk, 1990). These and other self-regulatory activities are likely to lead to success (Zimmerman, 1989; Zimmerman & Martinez-Pons, 1992).

Schunk (1994) tested the idea that providing children with a learning goal and the opportunity to evaluate their capabilities during mathematical skill learning would enhance achievement and self-efficacy better than providing a performance goal and no opportunity for self-evaluation. This study was based on prior research showing some benefits of goal setting and self-evaluation (Bandura & Cervone, 1983, 1986; Elliott & Dweck, 1988; Meece, Blumenfeld, & Hoyle, 1988; Schunk & Swartz, 1993a, 1993b). Fourth-grade students received instruction and practice over sessions. Half of the students worked under conditions involving a goal of learning how to solve problems (learning goal); for the other half the goal involved solving problems (performance goal). Students in each goal condition either did or did not evaluate their problem-solving capabilities. The results showed that the learning goal with or without self-evaluation and the performance goal with self-evaluation led to higher self-efficacy, skill, motivation, and task goal orientation, than did the performance goal without self-evaluation.

The present study was designed to explore more fully the conditions under which learning goals might be more effective than performance goals in raising achievement outcomes. The self-evaluation treatment used by Schunk (1994) was powerful in that it required children to assess their fraction capabilities on six occasions. Given that the instructional program was designed to teach skills and that children's skills were improving, this type of repetitive self-evaluation treatment may have made it highly probable that children would perceive their skill improvement and likely outweighed any differential effects due to type of goal. Although this study showed that learning goals are more effective than performance goals in the absence of explicit self-evaluation, perhaps learning goals also would prove advantageous when self-evaluation is less frequent or more subtle in nature. This type of situation reflects much school learning because learners typically do not assess their performance capabilities.

In the present study, subjects were assigned to a learning goal or performance goal condition but all received the opportunity for self-evaluation. The actual self-evaluation procedure was modified in that judgments were collected once (near the end of the instructional program) rather than six times (after each session). The procedure also was more subtle in that children assessed their progress in acquiring skills rather than their capabilities for solving types of problems as they did in the Schunk (1994) study. Theory and research show that progress indicators of cognitive skill acquisition often are unclear and many children find it difficult to determine whether they are making progress (Schunk & Swartz, 1993a, 1993b).

It was predicted that learning goals would lead to higher self-evaluation scores and achievement outcomes than performance goals. It was felt that the progress self-evaluation would complement the learning goal emphasis on

acquiring skills. Perceived progress in skill acquisition was expected to relate positively to motivation, self-efficacy, and skillful performance (Schunk, 1991).

Method

Subjects

The final sample included 40 fourth-grade students drawn from two classes in one elementary school. The 20 girls and 20 boys ranged in age from 9 years 1 month to 11 years 1 month (M = 9 years 9 months). Although different socioeconomic backgrounds were represented, children predominantly were middle class. Ethnic composition was 21 White and 19 African American students. Initially there were 44 students, but two were dropped because they missed some instructional sessions and two others were randomly selected from the appropriate cells to equalize cell sizes. Students were average achievers in mathematics and received instruction in regular classes.

Pretest

The pretest was administered by a tester from outside the school. It comprised measures of goal orientation, self-efficacy, skill, and persistence.

Goal orientation. Goal orientations (sets of behavioral intentions that influence how students approach and engage in learning activities) were assessed to determine if the goal and self-evaluation conditions exert differential effects on students' propensities toward various classroom goals. The goal orientation inventory included 18 items adapted from Meece et al. (1988). Each item tapped one of four goal orientations (number of items and sample item in parentheses): task--desire to independently master and understand academic work (5 items, "I want to do better than I have done before"); ego--desire to perform well to please the teacher and avoid trouble (4 items, "I want the teacher to think I am doing a good job"); affiliative--desire to share ideas and work with peers (4 items, "I want to work with my friends"); work avoidant--desire to accomplish academic work with minimum effort (5 items, "I want to do as little work as possible"). Children decided how well each item described how they usually felt during mathematics and judged it on a 10-point scale ranging from not at all (10) to very much (100). The items tapping each orientation were averaged; four scores are included in the data analyses. Reliability was assessed during a pilot study; test-retest coefficients were: .82 (task), .75 (ego), .77 (affiliative), .71 (work avoidant).

Self-efficacy. The self-efficacy test assessed children's perceived capabilities for correctly solving types of fraction problems. The scale ranged in 10-unit intervals from not sure (10) to really sure (100). There were 31 pairs of problems. The two problems constituting each pair were similar in form and operations required and corresponded to one problem on the skill test although they involved different numbers. The reliability of the efficacy test was assessed during the pilot study; test-retest r = .81.

Children received practice using the self-efficacy scale and then were shown briefly each pair of problems for about 2 s, which allowed assessment of problem difficulty but not actual solutions. For each pair, children judged their certainty of solving problems of that type (e.g., same form, requiring

the same operations, comparable in difficulty) by marking the efficacy value that corresponded to how they felt.

Skill and persistence. The skill test was administered after the efficacy assessment and comprised 31 problems that tapped addition and subtraction of fractions. The 31 problems included six different categories (number of problems and sample problem in parentheses): addition, like denominators, no carrying (5 problems, 1/6 + 4/6); addition, like denominators, carrying (5 problems, 9/10 + 5/10); addition, unlike denominators, no carrying (6 problems, 5/16 + 2/4); addition, unlike denominators, carrying (6 problems, 11/15 + 37/45); subtraction, like denominators, no regrouping (3 problems, 7/9 - 3/9); subtraction, unlike denominators, no regrouping (6 problems, 21/36 - 8/18). About 70% of these problems were similar to those children solved during the instructional sessions; the others were more complex. For example, during the sessions students solved problems with two terms, whereas some skill test problems included three terms (1/3 + 2/12 + 1/4). Different forms of the skill test were used on the pretest and posttest to eliminate effects due to problem familiarity (pilot study parallel forms $r = .85$).

The tester presented problems to children one at a time. For each problem children decided how long to work on it. Children were given no feedback on solution accuracy. The tester also recorded the length of time children spent solving problems as a measure of persistence.

Instructional Program

Children were assigned randomly within gender, ethnic background, and classroom, to either a learning goal (LG) or performance goal (PG) condition. Students received 45-minute instructional sessions over seven days. Children assigned to the same condition met in small groups with one of two female teachers from outside the school. For any given child, the same teacher administered all seven sessions but did not administer his or her pretest. Each teacher worked with both experimental conditions.

There were seven packets of instructional materials, one for each session. Six of these packets covered the six major types of fraction skills described above and the final packet contained review material. The format of the seven packets was identical. The first page explained the relevant operations and exemplified their application. Each of the following pages contained several similar problems to be solved using the depicted steps. Each set included more problems than children could complete during the session.

At the start of the first instructional session children were administered a self-efficacy for learning test. This test was identical to that of the pretest except that it comprised six sample pairs of problems instead of 31; the six pairs included problems representative of each of the six lessons. For this test, children judged capabilities for learning how to solve types of problems rather than how certain they were that they already could solve them. Reliability assessed during the pilot study yielded a test-retest reliability coefficient of $r = .77$.

Following this assessment, the teacher gave the goal instructions appropriate for children's condition, and verbally explained and demonstrated

the relevant fraction operations by referring to the explanatory page and by illustrating examples on the board. Included in this phase was instruction on applications of the fraction operations to real-world problems. After this modeled demonstration phase (about 10 min), students engaged in a hands-on activity with manipulatives and cutouts and solved a few practice problems (guided practice, about 10 min). Once the teacher was satisfied that children understood what to do, children solved problems alone during independent practice for the remainder of the session (25 min). It was felt that 25 min per session was sufficient to allow for demonstration of differences in self-regulatory processes brought about by the goal treatments.

Experimental Conditions

At the start of the first instructional session the teacher said to LG students:

> While you're working it helps to keep in mind what you're trying to do. You'll be trying to learn how to solve fraction problems where the denominators are the same and you have to add the numerators.

These instructions stressed the goal of learning to solve the problems rather than simply solving them. The same instructions were given at the start of each of the remaining six sessions except that the teacher substituted the name of the fraction skill they would be covering during that session.

Children assigned to the PG condition were told at the start of the first instructional session:

> While you're working it helps to keep in mind what you're trying to do. You'll be trying to solve fraction problems where the denominators are the same and you have to add the numerators.

These instructions did not explicitly mention learning. For the remaining sessions the teacher reiterated these instructions and substituted the name of the fraction skill to be covered during that session.

The difference between the learning and performance goal conditions seems subtle because it involves a slight change in wording of the instructions; however, they were given at the start of each session and the repetition was designed to enhance their effect. In addition, to ensure that the instructions were properly understood by children the teacher asked children to repeat them back to her, after which she asked if that sounded reasonable. No child in any condition expressed displeasure at the goal instructions.

Self-Evaluation Assessment

Self-evaluation was assessed at the end of the sixth instructional session. The self-evaluation instrument included the same six sample pairs of fraction problems used in the self-efficacy for learning test. For each sample pair, children were asked to think back to when the project began and decide how well they were doing now compared with then. Children made their six progress judgments on 10-unit scales ranging from not better (10) to a whole lot better (100). Reliability was assessed during the pilot study; the test-retest r was .72.

Self-satisfaction also was assessed because it is included in the self-reaction phase of self-regulation and is an integral component of the self-evaluation process (Bandura, 1986; Schunk, 1991). This measure assessed children's pleasure with their progress in skill acquisition. For each of the six sample pairs of problems children judged how pleased or happy they were about how much better they were now at solving the types of problems shown compared with when the project began. The 10-unit scales ranged from not pleased (10) to really pleased (100). The test-retest reliability coefficient determined during the pilot study was $r = .69$.

Posttest

The posttest was given on the day after the last instructional session. It included goal orientation, self-efficacy, skill, and persistence measures that were identical to those on the pretest except that a parallel form of the skill test was used to control for potential effects of children's selective memory of pretest problems. The tester was unaware of children's experimental assignments and performances during instruction.

Results

Means and standard deviations are shown in Table 1. Analyses of variance (ANOVAs) yielded no significant between-conditions differences on pretest measures, nor were there significant differences on any measure due to gender, ethnic background, or classroom.

Insert Table 1 about here

Self-Efficacy, Skill, Persistence

These three posttest measures were analyzed with multivariate analysis of covariance (MANCOVA) with goal (learning/performance) as the experimental factor and the corresponding pretest measures as covariates. This analysis was significant, lambda = .274, $F(3, 33) = 29.08$, $p < .001$. Analysis of covariance (ANCOVA) was applied to each posttest measure using the corresponding pretest measure as covariate. Significant effects were obtained for self-efficacy, $F(1, 37) = 34.92$, $p < .001$ ($MS_e = 126.27$), and for skill, $F(1, 37) = 77.84$, $p < .001$ ($MS_e = 3.86$). The LG group scored higher than the PG condition on both measures.

Goal Orientations

MANCOVA applied to the four goal orientation scales using pretest measures as covariates yielded a significant effect, lambda = .208, $F(4, 31) = 29.43$, $p < .001$. ANCOVAs yielded significance on task orientation, $F(1, 37) = 52.38$, $p < .001$ ($MS_e = 94.72$), ego orientation, $F(1, 37) = 55.10$, $p < .001$ ($MS_e = 90.10$), and work avoidant orientation $F(1, 37) = 4.68$, $p < .05$ ($MS_e = 709.76$). The LG condition scored higher on task orientation, whereas the PG condition judged ego orientation and work avoidant orientation higher.

Instructional Session Measures

The number of problems children completed during the independent practice portions of the instructional sessions was analyzed to determine the effects of treatments on children's motivation. This ANOVA yielded significance, $F(1, 38) = 15.09$, $p < .001$ ($MS_e = 18.97$). LG children solved significantly more problems than did PG students. Conditions did not differ in the proportion of problems solved correctly.

Self-efficacy for learning was analyzed with ANCOVA using pretest self-efficacy as the covariate. This analysis was nonsignificant.

Self-evaluation and self-satisfaction scores were analyzed with ANOVA. Both measures yielded significance: self-evaluation $F(1, 38) = 23.78$, $p < .001$ ($MS_e = 194.01$); self-satisfaction, $F(1, 38) = 28.62$, $p < .001$ ($MS_e = 111.29$). The LG condition scored significantly higher than the PG condition on both measures.

Correlation Analyses

Product-moment correlations were computed among instructional session and posttest measures. The number of problems that children completed related positively to self-efficacy, skill, and persistence, and negatively to ego orientation. Self-efficacy, skill, and persistence, were positively related to one another. Task orientation correlated positively with self-efficacy and skill; ego orientation correlated negatively with these measures. Self-efficacy for learning related positively to number of problems completed, as did self-evaluation and self-satisfaction. Self-evaluation and self-satisfaction scores related positively to posttest self-efficacy, skill, and task orientation; self-evaluation was negatively related to ego orientation. Self-satisfaction was positively correlated with self-evaluation.

Discussion

This study represents a systematic investigation into the effects of learning goals and opportunities for self-evaluation during mathematical skill acquisition. Although there is much goal setting research in educational settings, evidence is mixed on whether learning goals promote achievement outcomes better than performance goals. Self-evaluation is viewed as an integral component of self-regulation by many theoretical approaches, but evidence is lacking on whether having students evaluate their capabilities and progress in skill acquisition enhances achievement outcomes.

The results of this study shows that providing students with a goal of learning to solve problems and the opportunity to evaluate their progress in skill acquisition enhances motivation and achievement outcomes more than providing a performance goal with self-evaluation. These findings apparently are not due to goal properties, because the learning and performance goals were comparable in proximity, specificity, and difficulty. These results also cannot be due to instructional differences between treatment conditions because students in all conditions received the same amount and type of instruction and problem solving.

A theoretical explanation for these findings is as follows. Emphasizing to students that their goal is to learn to solve problems can raise their self-efficacy for learning and motivate them to regulate their task

performance and work diligently. Self-efficacy is substantiated as they observe their progress in skill acquisition. Higher self-efficacy helps to sustain motivation and increase skill acquisition (Schunk, 1991). With respect to self-evaluation, having students assess their progress in learning makes it clear that they have become more competent, and this perception strengthens self-efficacy and keeps students working productively.

The results of this study differ from those of Schunk (1994) in that this study but not the Schunk (1994) study supports the hypothesis that combining a learning goal with self-evaluation raises achievement outcomes more than does combining a performance goal with self-evaluation. The reason for this discrepancy cannot be identified precisely because the studies differed in frequency of self-evaluation (daily in Schunk (1994), once in this study) and focus of self-evaluation (capabilities in Schunk (1994), progress in skill acquisition and self-satisfaction with progress in this study). A daily assessment of capabilities is intensive and should clearly communicate to children that they are becoming more skillful. Under conditions of strong self-evaluation treatment, the type of goal may make little difference. In contrast, the single assessment session in the present experiment may not have made it clear that subjects had become more competent. Given that this assessment was closely tied to the learning goal because it called for self-evaluation of and self-satisfaction with progress in skill learning, it complemented that goal better than the performance goal and was more likely to raise motivation and achievement outcomes. This explanation is supported by the finding that goals did not differentially affect self-efficacy for learning, so subsequent differences in achievement outcomes may have come about due to intervening self-evaluation.

These findings support theory and research on the benefits of goals and self-evaluation on self-regulation processes and achievement (Bandura, 1991, 1993; Schunk, 1990; Zimmerman, 1989, 1994; Zimmerman & Martinez-Pons, 1992). It is interesting that learning goals and self-evaluation raised task orientation and lowered ego orientation. These results support the Meece et al. (1988) findings that students with task-mastery goals report active cognitive engagement characterized by self-regulatory activities and that motivation to learn is positively associated with goals stressing learning and understanding. Learning goals and self-evaluations help focus children's attention on their task progress and capabilities for learning (Schunk, 1990; Schunk & Swartz, 1993a, 1993b). Self-comparisons of present with past performances to determine progress constitute an integral component of a task orientation (Ames, 1992). Conversely, children oriented toward performance outcomes may be less apt to focus on learning progress, which will not result in high task orientation.

The present results must be qualified because students were acquiring skills and their self-evaluations were positive. Asking students to periodically assess their capabilities on a task they repeatedly have failed to master might lower, rather than raise, self-efficacy and motivation, because after many negative attempts students might conclude they are incapable of learning. To be effective, self-evaluation must be linked with instruction so students learn and perceive they are making progress.

The present results support the idea that self-efficacy is not merely a reflection of prior performances (Bandura, 1986). Although PG children attempted to solve fewer problems during instructional sessions compared with

students in the other conditions, the proportion of problems solved correctly by students in conditions did not differ. The present results suggest that treatment conditions differed in the extent they conveyed a sense of learning progress to students, which enhanced their self-efficacy, self-regulatory activities and learning. This research also shows that capability self-perceptions help to predict skillful performance.

The results of this project have implications for teaching mathematics. Learning goals can be easily incorporated by teachers into regular classroom instruction. Among children who are cognitively capable of evaluating their capabilities, self-evaluation may be a useful adjunct to testing as a means of assessing students' skills and of providing information to use in designing instruction. Although learning goals and self-evaluation are not necessary for all classroom activities, the present results suggest that, when combined with a sound instructional program, they facilitate self-regulated learning and achievement outcomes.

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Table 1
Means (and Standard Deviations)

Measure	Phase	Experimental Condition: Learning Goal	Experimental Condition: Performance Goal
Self-Efficacy	Pretest	45.8 (13.7)	46.3 (15.2)
	Posttest	86.3 (5.5)	65.2 (14.8)
Skill	Pretest	2.8 (1.5)	2.5 (2.2)
	Posttest	14.4 (1.9)	8.9 (2.0)
Persistence	Pretest	13.0 (3.2)	12.7 (3.2)
	Posttest	7.9 (2.7)	8.6 (4.4)
Task Orientation	Pretest	81.8 (11.5)	79.8 (10.8)
	Posttest	93.2 (6.5)	70.5 (12.2)
Ego Orientation	Pretest	96.1 (7.2)	95.1 (9.4)
	Posttest	72.3 (10.0)	94.1 (10.7)
Affiliative Orientation	Pretest	77.3 (18.3)	72.9 (22.3)
	Posttest	76.0 (21.0)	65.2 (28.1)
Work Avoidant Orientation	Pretest	40.6 (24.4)	42.2 (20.5)
	Posttest	32.5 (27.9)	51.6 (29.4)
No. of Problems Completed	Lessons	35.0 (4.4)	29.6 (4.4)
Self-Efficacy for Learning	Lessons	79.0 (20.0)	77.8 (20.6)
Self-Evaluation	Lessons	81.0 (12.0)	59.5 (15.6)
Self-Satisfaction	Lessons	80.2 (7.7)	62.4 (12.8)

N = 40; n = 20 per condition. Self-efficacy scores represent average judgment per problem; range is 10 - 100. Skill means represent number of correct solutions on 31 problems. Persistence scores are total min spent solving 31 problems. Goal orientation, self-efficacy for learning, self-evaluation, and self-satisfaction means represent average scores; range is 10 - 100. Number of problems completed is average per instructional session.